The **PHILIPPINE ENGINEERING JOURNAL** serves as a medium of exchange of technical information and dissemination of engineering knowledge through the publication of technical papers, technical notes, and research briefs. Published by UP National Engineering Center, the PHILIPPINE ENGINEERING JOURNAL is being distributed at reasonable rates to various government agencies, private industrial concerns, engineering schools, professional organizations, international entities, and practitioners in the field of engineering.

ISSN 0117 5564

Prof. Maria Antonia N. Tanchuling, Ph.D.

Executive Director National Engineering Center

Dr. Rinlee Butch M. Cervera Editor-in-Chief

EDITORIAL BOARD

Dr. Marjorie L. Baynosa
Dr. Ariel C. Blanco
Dr. Gerald Jo C. Denoga
Dr. Leslie Joy L. Diaz
Dr. John Richard E. Hizon
Dr. Iris Ann G. Martinez
Dr. Susan Pancho-Festin
Dr. Edwin N. Quiros
Dr. Analiza P. Rollon
Dr. Karl N. Vergel

Arlene H. De Ocampo Head, Engineering Information Division National Engineering Center

> Patricia M. Estopace Publication Coordinator

> > Erwin G. Gabriel Layout Artist

INTERNATIONAL ADVISORY BOARD

Dr. Alias Abdul Rahman Universiti Teknologi Malaysia, Malaysia

Dr. Joost Santos George Washington University, USA

Dr. Jiro Takemura Tokyo Institute of Technology, Japan

Dr. Chua-Chin Wang National Sun Yat-Sen University, Taiwan

> Dr. Jeffrey Rimer University of Houston, USA

Dr. Po-Ya Abel Chuang University of California Merced, USA

EXTERNAL ASSOCIATE EDITORS

Dr. Hongbo Cong University of Akron, USA

Dr. Mary Lyn Lim Coatings Innovation Center, USA

Dr. Aristotle Ubando De La Salle University

Room 207 Juinio Hall, UP National Engineering Center, UP Campus Diliman, Quezon City 1101 Telefax: (632) 8929 1710 Telephone Numbers: 8981-8500 loc. 3006 Direct Line: (632) 8927-1581

ABOUT THE COVER

Stop-Go Map (green for go, red for stop) based on the School Reopening Viability (SRV). The SRV is an indicator that the region has already reached the downtick points (infection, death) based on their vaccination coverage. (a) Infection SRV; (b) Death SRV; (c) Vaccination Coverage as of February 2022.